



Market Research for Developing an LMI Solar Pilot Program in Virginia

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CESA's Role

In early 2021, Clean Energy States Alliance (CESA), a coalition of state energy organizations working together to advance clean energy and bring the benefits of clean energy to all, received an anonymous grant to help Virginia develop a solar pilot program for low- and moderate-income (LMI) homes. Under the grant, CESA has been funded to work with the Virginia Department of Mines, Minerals and Energy (DMME) and the Clean Energy Advisory Board (CEAB) over the course of 12 months to support the design and implementation of a solar pilot program for LMI homeowners. In collaboration with DMME and the CEAB, CESA will work to advance a pilot program that reaches its intended audience, provides maximum impact without excessive administrative burdens, meets program benchmarks, and delivers meaningful benefits to participating LMI households.

Under the grant, CESA is prepared to provide assistance to DMME and the CEAB in several areas, including:

1. **LMI Solar Program Design:** CESA will prepare a written pilot program design and implementation plan.
2. **Stakeholder Engagement and Program Refinement:** CESA will help find meaningful ways to engage underserved communities and community-based organizations in the program design process.
3. **Preparation of a Program Solicitation:** CESA is prepared to help draft an RFP for DMME to issue to attract solar providers to participate in the program.
4. **Advising on Program Implementation and Marketing:** CESA is prepared to provide advice to DMME to ensure that the pilot program reaches its intended audience.
5. **Production of Educational and Promotional Materials:** CESA is prepared to help develop and design accessible materials and program information.

CESA's primary aim for its engagement with DMME and the CEAB is to help get a successful solar pilot for LMI homeowners up and running. After 12 months, CESA will continue to assist DMME on the operation of its program through DMME's membership in CESA, but to a much lesser degree.

As a starting point for the development of a LMI solar pilot program, CESA began focused, market research on Virginia's solar policy and regulatory landscape, residential solar project economics, income and energy burden demographics, and barriers and opportunities for launching solar program for LMI homeowners in the Commonwealth. This is the basis for this report. CESA research is intended to build off, not to supplant, prior research completed by DMME and the CEAB in these areas. We plan to use this research to inform an LMI solar program design proposal for the Commonwealth.

Virginia's Residential Solar Policy Solar Landscape

Virginia ranks 11th among US states in overall solar installed capacity. The number of residential solar installations has grown sharply in the last few years, driven by a range of solar friendly policy developments. Some policy developments have helped expand the solar market in the Commonwealth while others hold particular promise for enabling low- and moderate-income (LMI) Virginians to access solar energy.

Renewable Energy Targets

In 2007, the Virginia General Assembly passed legislation establishing a framework for a voluntary Renewable Portfolio Standard (RPS) program for the Commonwealth. Recently, the state's RPS targets have increased in ambition and enforceability. In 2018, the Virginia Grid Transformation and Security Act (SB 966) deemed 5,500 megawatts of solar and wind resources to be in Virginia's public interest. Then, in September 2019, Governor Ralph Northam issued an executive order (EO 43) calling for the development of an action plan to produce 100 percent of Virginia's electricity from carbon-free sources by 2050. In 2020, the Virginia General Assembly codified Governor Northam's goal, requiring the Commonwealth's two major investor-owned utilities to become carbon free by 2050 at the latest.

Virginia Clean Economy Act

In addition to establishing zero-carbon emissions goals for the Commonwealth's major utilities, the 2020 Virginia Clean Economy Act (SB 851/HB1526) requires Dominion Energy to procure at least one percent of its annual electricity for Renewable Portfolio Standard compliance from distributed generation facilities. It also requires that at least one quarter of such distributed generation be obtained from low-income qualifying projects. The law defines a low-income qualifying project as "a project that provides a minimum of 50 percent of the respective electric output to low-income utility customers." The State Corporation Commission is assessing Dominion Energy's proposal to comply with its Renewable Portfolio Standard obligations, including the utility's low-income obligations, in a pending case (SCC Case No. PUR-2020-00134).

The Virginia Clean Economy Act allows the use of power purchase agreements (PPAs) for solar projects sized between 50 kW and 3 MW through pilot programs conducted by Dominion Energy, Appalachian Power, and Old Dominion Power. LMI customers and tax-exempt organizations are exempted from the 50-kw size minimum for PPAs for solar projects, effectively making them eligible for small-scale solar PPAs under these pilot programs.

The Virginia Clean Economy Act directed the Commonwealth to join the Regional Greenhouse Initiative (RGGI), a voluntary, market-based, cap-and-invest program that has been joined by other Northeast and mid-Atlantic states. RGGI imposes limits on greenhouse gas emissions from electric plants, which has created a market for emissions allowances. Through an auction process, these RGGI allowances generate proceeds. The Virginia Department of Housing and Community Development (DHCD) Housing Innovations in Energy Efficiency Program is funded through RGGI proceeds. HIEE will make energy efficiency upgrades to new and existing residence to reduce energy bills for low-income Virginians. DHCD has embarked on a stakeholder process for HIEE program development. Currently, solar PV is not an eligible technology under this program, but roof repairs, which can help enable rooftop solar adoption for homeowners, is.

Virginia Solar Freedom Act (HB 572)

In 2020, the Virginia General Assembly enacted the Virginia Solar Freedom Act (HB 572). It established a program for Dominion and Old Dominion Power customers living in multifamily housing to offset their electricity usage through a subscription to a solar facility. The legislation also increased the state's cap on net energy metering from 1% to 6% of each Virginia utility's

peak load and set aside one percent of the available net energy metering capacity for low-income customers. The State Corporation Commission has proposed regulations to implement the amended net metering cap under the Act (SCC Case No. PUR-2020-00195).

Shared Solar (SB 629) and Multifamily Shared Solar (HB 1647 / SB 710) Legislation

In 2020, the Virginia General Assembly passed SB 629, which ordered the State Corporation Commission to establish a shared solar program for Dominion Energy customers in Virginia. The statute allows Dominion Energy customers to subscribe to a shared solar facility for the amount of electricity generated by it. Under SB 629, the State Corporation Commission must establish a minimum bill for all shared solar subscribers, except for low-income customers.

In December 2020, the State Corporation Commission issued shared solar program rules (SCC Case No. PUR-2020-00125). Under the rules, the maximum size of the shared solar program must not exceed 150 megawatts, at least 30% of which must be apportioned to low-income customers. Each entity operating or owning a shared solar facility must demonstrate that it meets the low-income customer requirement. After the program's 30% low-income requirement is satisfied, the program will be expanded to a cumulative total of 200 megawatts. Generally, Dominion Energy customers will be subject to a minimum bill requirement to subscribe to a shared solar facility, but low-income customers are exempt from this provision. Dominion Energy is to begin accepting applications for registration by July 1, 2021.

In 2020, the Virginia General Assembly also passed HB 572, HB 1184, HB 1647, and SB 710, which together require the State Corporation Commission to establish a program to enable in multifamily housing residents in Dominion Energy and Old Dominion Power service territory the opportunity to participate in shared solar projects. Unlike the shared solar program under SB 629, the shared solar program for multifamily Dominion and Old Dominion Power Company customers does not include a minimum bill requirement and does not contain an exception for low-income customers.

Enabling Statute for the Virginia Clean Energy Advisory Board

In 2019, Virginia General Assembly passed HB 2741, which created the CEAB and directed it to work with the DMME to "establish a pilot program for disbursing loans or rebates for the installation of solar energy infrastructure in low-income and moderate-income households" (HB 2741). Through this legislation, the Virginia General Assembly designated a special non-reverting fund in the state treasury for LMI solar program financing. The CEAB was convened in 2020 and is working to advance an LMI solar pilot program in the Commonwealth. In 2020, the General Assembly passed HB 1707, which repealed a 2022 sunset provision for the CEAB, and added additional Board members to its composition.

Requirement for Energy Efficiency and Solar Programs for Vulnerable Dominion Energy and Appalachian Power Customers

Enacted in 2019, HB 2789 ordered Dominion Energy and Appalachian Power to develop new pilot programs to offer solar and energy efficiency incentives to low-income, elderly, and disabled customers. In December 2020, Dominion petitioned the State Corporation Commission to offer a solar program under HB 2789 for a three-year period from January 2021 through the end of 2023 with a total proposed budget of \$31 million. Dominion Energy's solar program

proposal under HB 2789 is currently pending before the State Corporation Commission (SCC Case No. PUR-2020-00274).

Authorization for On-Bill Financing Programs for Coops

During the 2020 legislative session, Governor Northam signed SB 754 into law. The statute allows electric cooperatives in Virginia to create an on-bill tariff program on or after January 1, 2021. On-bill financing programs enable electric cooperative customers to pay the costs of energy efficiency and clean energy upgrades over time through a line-item charge on their monthly electric bills. This on-bill line-item charge is assigned to the electric meter rather than to a customer personally. Virginia's law allows electric cooperatives to create programs without State Corporation Commission approval, but program development requires a stakeholder process that "include[s] an opportunity to participate for low-income and middle-income advocates, energy efficiency advocates, affordable housing advocates, and the staff of the [State Corporation] Commission."

Authorization for the Establishment of Local Green Banks

Passed in 2021, HB 1919 allows Virginia localities to establish green banks to promote clean energy investment. HB 1919 requires such local green banks to be public, quasi-public, or nonprofit entities. No local green banks have been created in Virginia under HB 1919 yet.

Funding for a Solar Pilot Program for LMI Homeowners

DMME has received approval to re-purpose approximately \$200,000 in federal American Recovery and Reinvestment Act (ARRA) funds to support an LMI solar pilot program. This funding is being placed in Virginia's statutorily created Low-to-Moderate Income Solar Loan and Rebate Fund. It represents the entire corpus of Virginia's Low-to-Moderate Income Solar Loan and Rebate Fund and is the only dedicated, direct, public program funding available for an LMI solar pilot under HB 2741 to date.

In future years, DMME staff may petition for a program funding allocation from Virginia's General Funds as part of the state's annual budget process. (DMME has requested funding through these channels to support an LMI solar pilot before, but with other pressing budgetary spending priorities, these have been denied.) A successful pilot program might help demonstrate the case for long-term program investment and expansion by the Virginia General Assembly. DMME and the CEAB have also explored the possibility of leveraging private investment to support solar for LMI residents with organizations such as the Coalition for Green Capital and the Climate Access Fund. Through CESA's US Department of Energy-supported *Scaling Up Solar for Under-Resourced Communities* project, Virginia may apply for up to \$50,000 to support the launch of a solar program for LMI homeowners.

Residential Solar System Cost Analysis

We conducted a residential solar installation financial analysis for Virginia under different financing parameters to get an indication of the costs of a typical rooftop system and to help identify the level of subsidy necessary for cash-flow positive solar transactions for LMI

Virginians. The methodology we used was developed by the North Carolina Clean Energy Technology Center, and they calculated the results.

Methodology and Assumptions

We costed out a typical residential solar system in three Virginia locations—Accomack County, Roanoke, and Virginia Beach—served by three different utilities—A&N Cooperative, Appalachian Power, and Dominion Energy, respectively. We examined three different scenarios for financing such a system in these locations without any new special incentives for LMI solar. The three scenarios involved 15-year market-rate loans at 4.74 percent, described below:

1. A homeowner who takes out a loan and then claims the federal investment tax credit and any applicable state credit at the end of the year.
2. A homeowner who takes out a smaller loan that does not include the value of the tax credits. For example, the homeowner has savings or another way to pay for part of the system upfront and then receives the tax credits at the end of the year.
3. A homeowner who is unable to take advantage of the federal tax credit or any applicable state tax credit.

To begin to understand the level of special state incentives that might be needed for cash-flow positive solar transactions for LMI homeowners, we modeled two alternative possible special incentives for each of the loan scenarios:

- 1) A buy-down of the interest rate from 4.74 percent to 2 percent. If this interest rate-buy-down was subsidized by the state, it would cost Virginia between \$1,800 to \$4,000 per installation.
- 2) An upfront cash payment that reduces the system cost by \$5,000.

For the Virginia Beach (Dominion Energy), we also looked at the amount required for an upfront cash payment to enable a cash-flow positive transaction in Year 1.

Because residential solar leases are not currently being offered in the Virginia marketplace, there is no existing data for lease prices for Virginia. However, the numbers for loan products with monetization of the federal tax credit gives a rough sense of the economics of a residential solar system under a lease model. We also modeled a solar lease based on the structure used in some other states. This is not to say that solar companies in Virginia would offer leases with these terms, but it provides an estimate of what a residential solar lease could look like in the Commonwealth.

We modeled a 6.4-kilowatt system because that was the median size for all residential systems installed in the US in 2018, according to Lawrence Berkeley National Laboratory's *Tracking the Sun* report, and is coincidentally also the median size for the systems installed on LMI single-family homes through the Connecticut Green Bank's Solar for All Program. We assumed an annual electricity price escalation rate of 2.5% and an annual degradation rate of 0.5% and a discount rate of 0%. We modeled a typical solar loan term—in this case, a 15-year loan with no payments due in years 16-25. We assumed a monetizable federal investment tax credit of 26% would be monetizable. (Currently, the investment tax credit for solar installations is set at 26%

and is scheduled to step down to 22% in 2023. Thereafter, no investment tax credit is available for resident-owned solar installations.) Our analysis assumed a per kilowatt system cost of \$3.05 for a 6.4-kW installation. Different rate tariffs—fixed bill charges and energy rates—as well as sale tax and property tax rates, apply depending upon the system location modeled.

Results

Accomack 6.4-kW Installation

Scenario	Monthly Loan Payment	Net Monthly Savings		Payback Period
Market Rate Loan (4.74%) without Special State Incentives				
Loan for homeowner who qualifies for federal tax credit	\$158.22	Year One	(\$83.84)	22 Years
		25-Year Average	\$20.11	
Loan with federal tax credit received and excluded from upfront cost	\$116.20	Year One	(\$41.82)	20 Years
		25-Year Average	\$27.93	
Loan with no federal or state tax credit	\$158.22	Year One	(\$83.84)	25 Years
		25-Year Average	\$2.92	
State Incentive: 2% Interest Rate				
Loan for homeowner who qualifies for federal tax credit	\$130.09	Year One	(\$55.71)	18 Years
		25-Year Average	\$36.99	
Loan with federal tax credit received and excluded from upfront cost	\$95.54	Year One	(\$11.16)	17 Years
		25-Year Average	\$40.33	
Loan with no federal or state tax credit	\$130.09	Year One	(\$55.71)	22 Years
		25-Year Average	\$19.60	
State Incentive: \$5,000 Rebate				
Loan for homeowner who qualifies for federal tax credit	\$118.78	Year One	(\$44.40)	17 Years
		25-Year Average	\$43.77	
Loan with federal tax credit received and excluded from upfront cost	\$76.76	Year One	(\$2.38)	15 Years
		25-Year Average	\$51.60	
Loan with no federal or state tax credit	\$118.78	Year One	(\$44.40)	20 Years
		25-Year Average	\$26.39	

Roanoke 6.4-kW Installation

Scenario	Monthly Loan Payment	Net Monthly Savings		Payback Period
Market Rate Loan (4.74%) without Special State Incentives				
Loan for homeowner who qualifies for federal tax credit	\$158.22	Year One	(\$88.56)	>25 Years
		25-Year Average	(\$2.37)	
Loan with federal tax credit received and excluded from upfront cost	\$116.20	Year One	(\$46.54)	24 Years
		25-Year Average	\$5.46	
Loan with no federal or state tax credit	\$158.22	Year One	(\$88.56)	>25 Years
		25-Year Average	(\$19.75)	
State Incentive: 2% Interest Rate				
Loan for homeowner who qualifies for federal tax credit	\$130.09	Year One	(\$60.43)	22 Years
		25-Year Average	\$14.51	
Loan with federal tax credit received and excluded from upfront cost	\$95.54	Year One	(\$25.88)	21 Years
		25-Year Average	\$17.86	
Loan with no federal or state tax credit	\$130.09	Year One	(\$60.43)	>25 Years
		25-Year Average	(\$2.87)	
State Incentive: \$5,000 Rebate				
Loan for homeowner who qualifies for federal tax credit	\$118.78	Year One	(\$49.12)	20 Years
		25-Year Average	\$21.29	
Loan with federal tax credit received and excluded from upfront cost	\$76.76	Year One	(\$7.10)	18 Years
		25-Year Average	\$29.12	
Loan with no federal or state tax credit	\$118.78	Year One	(\$49.12)	24 Years
		25-Year Average	\$3.91	

Virginia Beach 6.4-kW Installation

Scenario	Monthly Loan Payment	Net Monthly Savings	Payback Period
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Market Rate Loan (4.74%) without Special State Incentives				
Loan for homeowner who qualifies for federal tax credit	\$158.78	Year One	(\$89.62)	23 Years
		25-Year Average	\$14.60	
Loan with federal tax credit received and excluded from upfront cost	\$116.09	Year One	(\$59.22)	21 Years
		25-Year Average	\$22.76	
Loan with no federal or state tax credit	\$158.78	Year One	(\$89.62)	>25 Years
		25-Year Average	(\$2.85)	
State Incentive: 2% Interest Rate				
Loan for homeowner who qualifies for federal tax credit	\$130.55	Year One	(\$61.39)	19 Years
		25-Year Average	\$31.54	
Loan with federal tax credit received and excluded from upfront cost	\$95.45	Year One	(\$36.47)	19 Years
		25-Year Average	\$35.15	
Loan with no federal or state tax credit	\$130.55	Year One	(\$61.39)	23 Years
		25-Year Average	\$14.09	
State Incentive: \$5,000 Rebate				
Loan for homeowner who qualifies for federal tax credit	\$119.34	Year One	(\$50.18)	18 Years
		25-Year Average	\$32.55	
Loan with federal tax credit received and excluded from upfront cost	\$76.65	Year One	(\$7.49)	16 Years
		25-Year Average	\$46.43	
Loan with no federal or state tax credit	\$119.34	Year One	(\$50.18)	22 Years
		25-Year Average	\$20.81	
State Incentive: \$12,000 Rebate				
Loan for homeowner who qualifies for federal tax credit	\$64.12	Year One	\$5.04	11 Years
		25-Year Average	\$71.39	
State Incentive: \$6,500 Rebate				
Loan with federal tax credit received and excluded from upfront cost	\$64.82	Year One	\$4.35	15 Years
		25-Year Average	\$53.52	

Findings and Conclusions

A number of key findings emerged from this analysis:

1. The overall costs for typical residential installation did not yield dramatically different results between the three Virginia locations we modeled.
2. None of the basic loan financing scenarios in any of the modeled locations yielded a positive cash flow in Year One. Initial negative cash flow from taking out a loan to finance a solar system is a large hurdle for LMI customers in Virginia.
3. Being able to take advantage of the federal investment tax credit makes a significant difference in Year One monthly loan costs. If a customer is able to deduct the value of the federal tax credit from the upfront cost of the system, Year One loan costs are roughly half of what they would otherwise be under a “no federal or state tax credit” scenario.
4. Neither a buy-down of the interest rate of the loan to 2 percent, nor adding an upfront cash payment to reduce the system cost by \$5,000 was sufficient by itself to generate a cash-flow positive solar loan transaction. A significant incentive—greater than an interest rate buydown to 2 percent or a \$5,000 rebate—is necessary for a customer to have a cash-flow positive solar loan transaction from Year One through the life of the system.
5. The hypothetical lease structure we modeled, which would enable monetization of the federal tax credit, provides first-year savings of around \$16 to \$20. No solar leases are being offered in Virginia and the lease terms we modeled are theoretical, but our analysis suggests cash-flow positive leases could be achieved in Virginia, especially with an additional solar rebate folded in.
6. Under our model, the rebate necessary to achieve a first-year savings of about \$4 to \$5 for a 6.4-kw system in Virginia Beach is \$6,500, assuming that federal tax credit can be monetized and is used to offset the upfront system cost. If the federal tax credit is not monetized and deducted from the system cost, a \$12,000 rebate would be necessary to achieve nominal savings in Year One.

Based on this analysis, we reached the following conclusions:

1. A 25-year lease offers a preferable financing product for LMI homeowners compared to a loan:
 - A 25-year lease spreads out the financing over a longer period than a typical 15-year loan. That makes it easier to ensure immediate savings in Year One, even if the average annual savings over 25 years may be less.
 - Because the leasing company, rather than the homeowner, owns the solar system, it can take advantage of a federal tax credit even if the customer cannot. Low-income customers often do not have sufficient tax liability to take advantage of the federal tax credit.
 - Low-income customers may not be able to qualify for market rate loans due to insufficient income, credit score, or debt-to-income ratios. LMI customers may

also be reluctant to take on additional debt. Solar leases offer an alternative. Some solar lease companies offer alternative underwriting criteria.

- A solar lease offers LMI customers fixed monthly expense predictability. Leases may also avoid the need for LMI customers to carefully manage their solar systems since insurance, maintenance, repairs, and inverter replacement are often included as part of a solar lease package. Under a lease model, the homeowner can usually transfer the solar lease to the next homeowner for the remainder of the contract term, provided the new owner meets the qualifying criteria to take over the third-party lending agreement obligations.
2. Since we did not have access to real-world lease data from Virginia, to better understand the market conditions necessary to create a cash-flow positive solar lease transaction, we looked at California, where we had access to real-world loan and solar lease data. In California, a solar loan for a homeowner who qualifies for the federal tax credit produces Year One savings of about four dollars. In the same California market, a real-world 25-year solar lease product yields savings of about \$50 per year. To analogize to the Virginia market, to make a solar loan yield four dollars of Year One savings for a customer requires an upfront cash incentive of \$6,500-\$12,000.
 3. Virginia allows local jurisdictions to exempt residential solar from property taxes. This can have a substantial impact on solar project economics. With a property tax exemption, the rebate necessary to achieve a first-year savings of about \$5 for a 6.4-kw system is \$4,750, assuming the federal tax credit could be used to offset the upfront cost of the system. Without a property tax exemption, the rebate necessary to achieve a first-year savings of \$4-\$5 is \$6,500 under the same parameters.
 4. Analyzing the financial models, we think it is reasonable to assume that approximately \$6,500 in public subsidy per project is necessary to ensure participating LMI households benefit from their solar transaction.
 5. Assuming approximately \$6,500 in direct public subsidy is necessary for each system installed and an initial pilot program financing budget capped at \$200,000, about 30 cash-flow positive projects could be completed under the pilot.

Virginia Income and Energy Burden Demographics

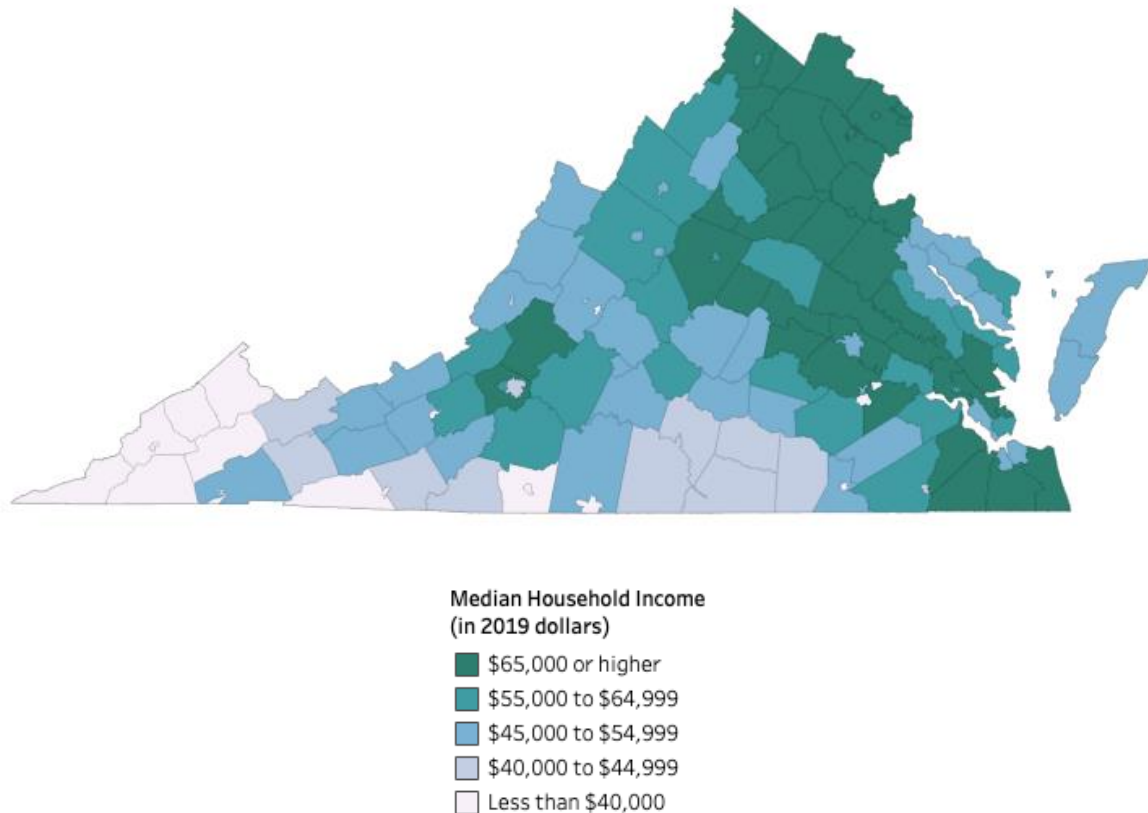
Virginia ranks 12th among US states in population and 14th in population density. The most populous areas of the Commonwealth are in the northeast part of the state (in the broader metropolitan area outside the District of Columbia), in and around metropolitan areas of Charlottesville, Richmond, and Roanoke, and in the southeastern part of the state (in the greater Virginia Beach metropolitan area).

Based on US Census Bureau data, the median household income in Virginia between 2015 and 2019 was \$74,222, considerably above the 2019 US median household income of \$65,712. The owner-occupied housing rate between 2015 and 2019 was 66.3%. Virginia's poverty rate (the percentage of a population whose income falls below the poverty line) in 2018 was 10.7%, which is below the national poverty rate of 13.1%. But despite Virginia's higher-than-national

median household income and lower-than-national poverty rate, poverty and high energy burdens remain prevalent, especially in rural parts of the Commonwealth.

The figure below shows median household income ranges by county between 2015-2019 in Virginia.

Figure 1. Median Household Income by County (2015-2019)

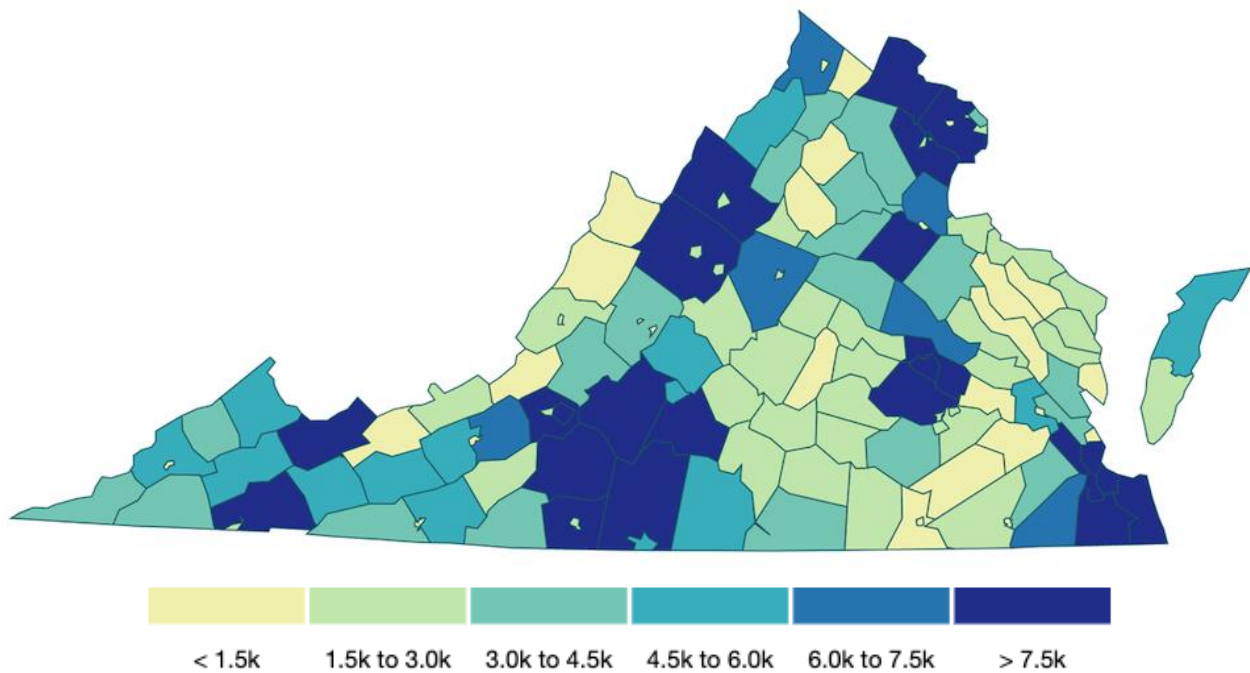


Source: US Census Bureau, <https://www.census.gov/library/visualizations/interactive/acs-median-household-income-2015-2019.html>

Unsurprisingly, median household incomes in more rural counties tend to be lower than in their population-dense counterparts.

The figure below shows low-income (80% or below the area median income), owner-occupied housing counts by county.

Figure 2. Low-Income, Owner-Occupied Housing Counts by County

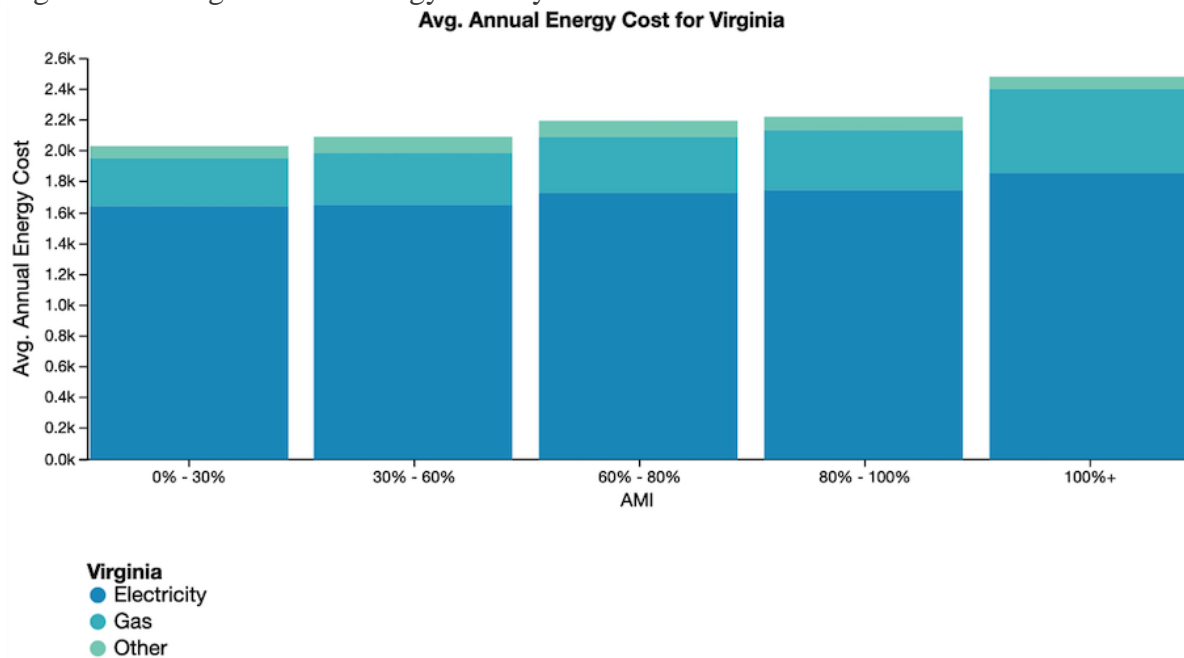


Source: US Department of Energy Low Income Energy Affordability Data (LEAD) Tool,
<https://www.energy.gov/eere/slsc/maps/lead-tool#>

Low-income households living in owner-occupied homes are widespread in more densely populated counties, but the figure also indicates some concentrations in a handful of less population-dense counties (for example, Tazewell County in the southwestern region and Henry County in the southside region of the state).

The figure below shows the average annual energy cost for Virginia broken out by area median income stratification and by energy source (electricity, gas, and other).

Figure 3. Average Annual Energy Cost by Area Median Income Band

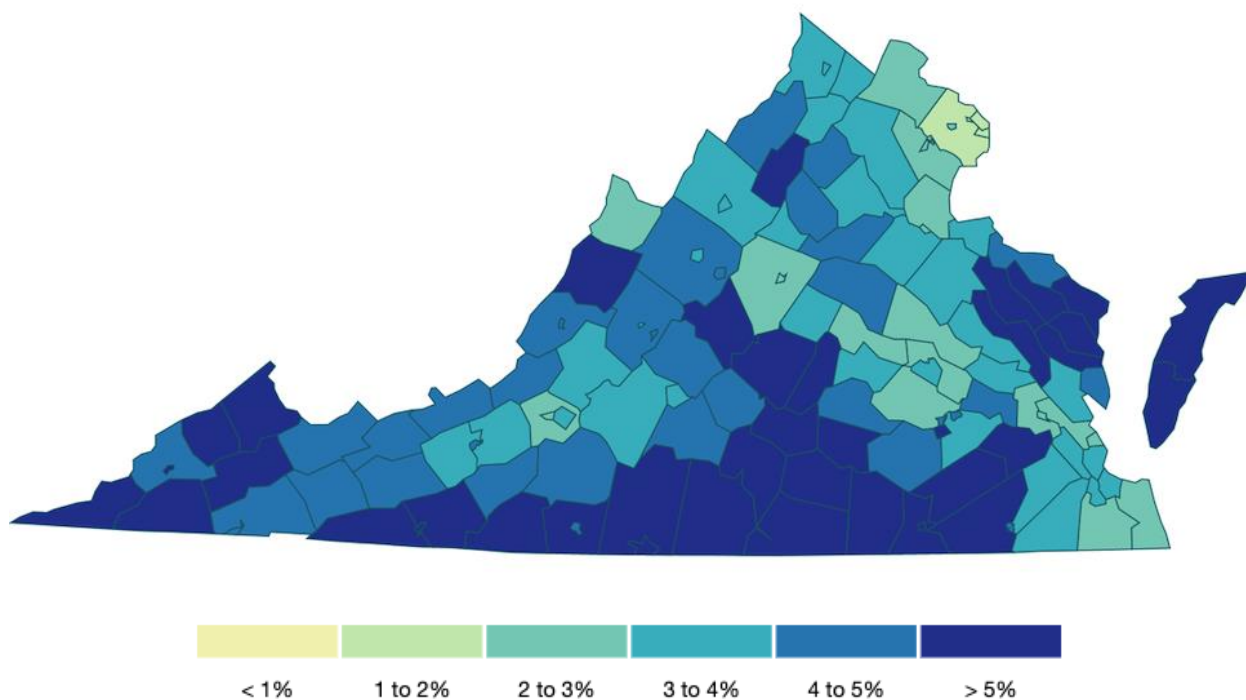


Source: US Department of Energy Low Income Energy Affordability Data (LEAD) Tool,
<https://www.energy.gov/eere/slsc/maps/lead-tool#>

Virginia households in lower area median income stratifications tend to spend slightly less in gross on electricity annually, but as a percentage of income, this picture changes dramatically. Across the Commonwealth, the average energy burden for low-income, owner-occupied households is 8% according to the US Department of Energy LEAD Tool. An energy burden above 6% is typically considered a high energy burden.

The figure below shows the average energy burden (the percentage of gross household income spent on energy costs) by county.

Figure 3. Average Energy Burden by County



Source: US Department of Energy Low Income Energy Affordability Data (LEAD) Tool,
<https://www.energy.gov/eere/slsc/maps/lead-tool#>

Darker blue counties—those with higher energy burdens—tend to be concentrated in the more rural parts of the state in the southwestern, southside, and eastern counties of Virginia.

Overall, Virginia’s income and energy burden demographics demonstrate ample opportunity to deliver bill savings and reduce energy burdens for LMI owner-occupied homes in Virginia through a solar program targeted for this population.

Locational Variables

Knowing that a pilot with an initial budget of \$200,000 can only reach a relatively small number of households (30, based on our rough approximation), we have begun to zero in on potential jurisdictions. Our basic assumption for zeroing in on potential target jurisdictions for a LMI solar pilot was that a program at the scale being contemplated would be focused in a few select communities so it could take advantage of focused marketing and community engagement and leverage economies of scale using a competitively selected installer model. Under a competitively selected installer model, DMME would be able to retain direct oversight controls over participating solar companies. Selected solar installers could offer cost-competitive pricing with increased installation volumes and targeted customer acquisition support.

Using analysis generated by DMME staff through the US Department of Energy’s Low Income Energy Affordability Data (LEAD) Tool as our starting point, we assessed the following variables at the county and city level in Virginia:

Electric Utility Service Territory

Dominion Energy and Appalachian Power are in the process of developing LMI solar and efficiency programs per HB 2789. To avoid potential program redundancy, we gave preference to jurisdictions outside of the Dominion Energy and Appalachian Power service territory.

Energy Burden

We gave preference to jurisdictions with higher energy burdens—average annual energy expenditures as a percentage of annual household income. The 21 potential target locations all displayed high energy burdens (between 9 and 24 percent).

Single-Family Owner-Occupied Housing Count

Because the LMI renter population will be eligible to participate in Virginia’s forthcoming shared solar program, we assumed that this LMI solar pilot program would target single-family homeowners. We gave a slight preference to those cities and counties with higher single-family owner-occupied housing counts.

LMI Housing Count

We gave significant preference to jurisdictions with higher LMI housing counts. Since § 45.1-399 of the Code of Virginia dictates pilot program eligibility as “open to any Virginia resident whose household income is at or below 80 percent of the state median income or regional median income, whichever is greater,” we used 80% area median income as our LMI thresholds for the purpose of our housing count.

Percentage of LMI Single-Family Housing

In addition to looking at LMI and single-family owner-occupied housing counts, we also explored the LMI single-family housing count as a percentage of the total housing count for Virginia. This gave us a sense of the density of LMI single-family homes within each jurisdiction.

Population

We assessed the overall population of the potential target jurisdictions we zeroed in on to ensure that there would be an adequate population base in selected jurisdictions to enable a pilot to generate sufficient program enrollment. Overall jurisdictional population numbers also helped us diversify our potential pilot locations between urban and rural geographies. Hopewell has a significantly higher population than the other cities we identified as potential targets.

Solar Property Tax Exemption Status

Virginia law allows cities and counties to exempt or partially exempt solar equipment from local property taxes. Solar property tax exemption reduces the amount of public subsidy necessary to ensure cashflow positive solar transactions for LMI customers and can have a substantial impact on residential solar project economics. Thus, we gave preference to those jurisdictions that provided solar property tax exemptions.

Potential Target Jurisdictions

Weighing all these factors, we arrived at a list of 21 potential target jurisdictions for consideration. Below is a table of the potential jurisdictions we derived in our assessment.

Table 1. Table of Potential Jurisdictions with Data on Locational Variables

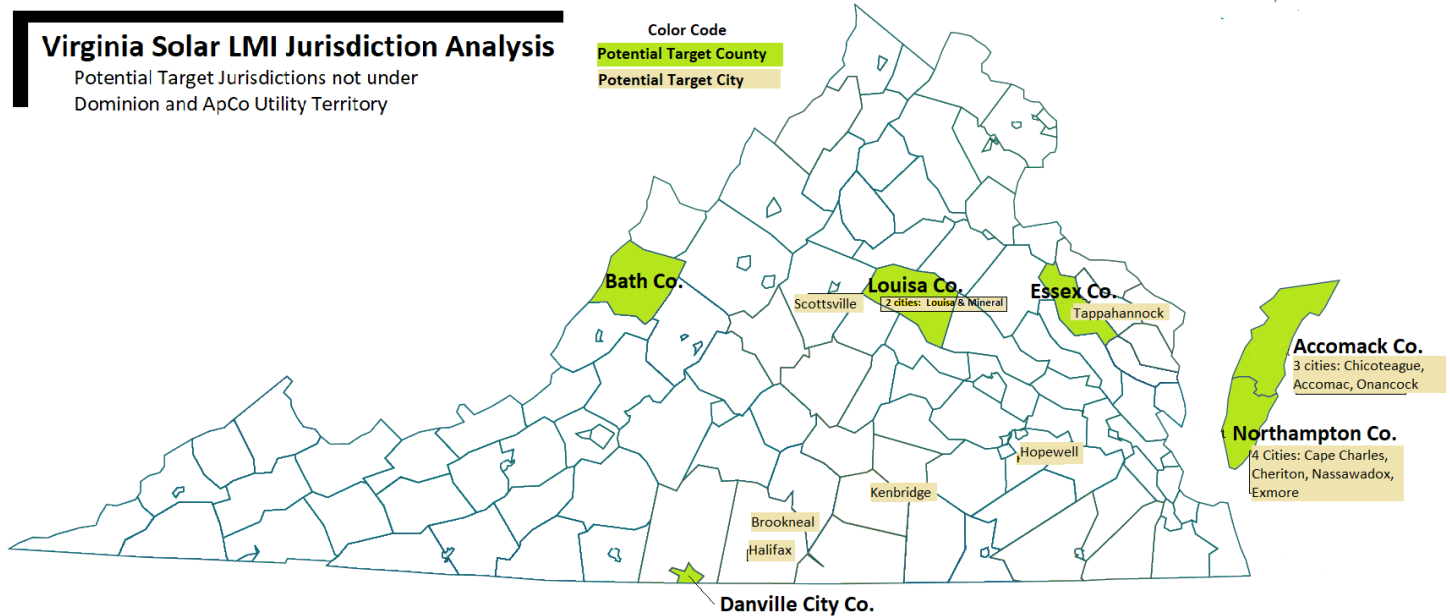
Jurisdiction Type	Jurisdiction	Solary Property Tax Exemption	Avg. Energy Burden (% income)	Avg. Annual Energy Cost	% LMI Housing Counts (All/LMI)	LMI Housing Counts	All Housing Count	Population	Primary Utility Service Territory
County	Danville city County	Y	19	4566	37%	1105	2979	38,834	Danville Utilites
County	Accomack County	N	14	3119	26%	1025	4018	31,786	A&N Electric Cooperative
City	Chincoteague	N	24	4847	23%	127	557	2,913	A&N Electric Cooperative
City	Tappahannock	N	14	2701	31%	105	337	2,380	Rappahannock Electric Cooperative
City	Cape Charles	N	14	3097	28%	56	199	990	A&N Electric Cooperative
County	Northampton County	N	14	2932	23%	351	1549	11,608	A&N Electric Cooperative
County	Essex County	N	14	2846	22%	398	1849	11,067	Rappahannock Electric Cooperative
City	Louisa	N	10	2638	34%	74	217	1,610	Rappahannock Electric Cooperative
County	Louisa County	N	10	2799	26%	1592	6123	39,205	Rappahannock Electric Cooperative
City	Scottsville	Y	9	3060	44%	61	138	597	Central Virginia Electric Cooperative
City	Accomac	N	14	2739	29%	15	51	496	A&N Electric Cooperative
County	Bath County	N	12	2878	35%	160	457	3,935	BARC Electric Cooperative
City	Hopewell	N	8	2514	51%	1386	2734	22,196	Prince George Electric Cooperative
City	Cheriton	N	14	3097	28%	14	50	477	A&N Electric Cooperative
City	Onancock	N	14	2678	24%	49	203	1,262	A&N Electric Cooperative
City	Nassawadox	N	13	2823	21%	10	48	495	A&N Electric Cooperative
City	Exmore	N	13	2823	21%	32	154	1,445	A&N Electric Cooperative
City	Brookneal	N	13	2908	21%	26	126	1,115	Southside Electirc Cooperative
City	Halifax	N	12	2698	34%	52	151	1,252	Mecklenburg Electtric Cooperative
City	Kenbridge	N	12	2828	32%	37	116	1,241	Southisde Electric Cooperative
City	Mineral	N	11	2965	26%	21	80	510	Rappahannock Electric Cooperative

Table 2. Potential Target Jurisdictions and Their Primary Electric Utilities

21 Target Jurisdictions		8 Electric Cooperatives
Potential Target	Potential Target Cities	Primary Utility Service Territory
Accomack County	(3) Chincoteague, Accomac, Onancock	A&N Electric Cooperative
Louisa County	(2) Louisa, Mineral	Rappahannock Electric Cooperative
Northampton County	(4) Cape Charles, Cheriton, Nassawadox, Exmore	A&N Electric Cooperative
Bath County		BARC Electric Cooperative
Essex County		Rappahannock Electric Cooperative
Danville city County		Danville Utilities
	Brookneal, Halifax	Mecklenburg Electric Cooperative
	Tappahannock	Rappahannock Electric Cooperative

Hopewell	Prince George Electric Cooperative
Kenbridge	Southside Electric Cooperative
Scottsville	Central Virginia Electric Cooperative

Figure 4. Map of Potential Target Jurisdictions



Next Steps

With input from DMME, the CEAB, and stakeholders on the ground in these jurisdictions, we plan to narrow down our list of potential target jurisdictions to two or three, which we will put forward as proposed locations for a pilot. Key stakeholders to solicit input from within the potential target jurisdictions include community-based organizations, Weatherization Assistance Program providers, local electric utility representatives, municipal officials, local solar installers, and single-family affordable housing providers.

Statutory Considerations

Various considerations emerged as we began to outline LMI solar pilot design possibilities and more deeply delve into the program's authorizing legislation:

Third-Party Solar System Ownership

As noted above, third-party residential solar system ownership structures hold promise for solar programs for LMI homeowners because they enable monetization of the federal solar tax credit and reduce capital investment burdens on participating LMI households, but their legality is somewhat uncertain in Virginia. Attorneys for the Commonwealth are exploring this issue further. Resolving this issue will be helpful for LMI solar pilot program development.

Income Threshold

The enabling statute for Virginia’s LMI solar pilot calls for the program to “be open to any Virginia resident whose household income is at or below 80 percent of the state median income or regional median income, whichever is greater.” Virginia’s Weatherization Assistance Program (WAP) income guidelines follow the state Low-Income Heating Assistance Program (LIHEAP) limit of 60% state median income (SMI) or below for households of seven or less. Independently verifying LMI solar pilot program eligibility at a different threshold than is used by other social service programs in Virginia could present a heavy administrative burden. Since WAP and LIHEAP eligibility currently cap at 60% SMI in Virginia, we suggest focusing the solar pilot for LMI homeowners on those who have already qualified for WAP or LIHEAP. Leveraging existing programs’ income verification will make intake and customer qualification much less burdensome for an LMI solar pilot. If the pilot program is expanded at a later date, the target income band could be enlarged at that time.

Requirement to Demonstrate Reduced Energy Consumption through Prior Efficiency Upgrades

Section 45.1-399(B)(iii) of the enabling statute for Virginia’s LMI solar pilot requires that program applicants demonstrate prior energy efficiency upgrades resulting in a reduction of energy consumption at least 12 percent. The CEAB 2020 Annual Report suggests “using WAP program audits and final work scopes with a Savings to Investment Ratio (SIR) of greater than 1.0 for energy efficiency measures as a proxy for the 12% reduction in energy consumption required in the Virginia Code to qualify WAP customers for eligibility under the LMI Solar Loan and Rebate program.” We are strongly inclined to follow the CEAB’s recommendation here. The CEAB’s Annual Report notes, “A reasonable interpretation of the Virginia Code allows for a reduction to be measured in terms of dollar cost savings, so that both electric and fuel savings can be included and stated as a single metric.” We agree. Further exploration and coordination with WAP providers will be necessary for demonstrating SIR scores of greater than 1.0 for pilot program eligibility.

Incentive Payment

The enabling statute for the LMI solar pilot requires any loans or rebates issued under the program to be remitted within 60 days of the receipt of the claim. This suggests that the structure of the LMI incentive under the program will be issued as a lump-sum payment. We think a lump-sum incentive is workable if it can be effectively factored into the system cost so it reduces LMI customers’ monthly loan, solar lease, or solar power purchase agreement payments.

Incentive Cap

Section 45.1-399(G) of the enabling statute for Virginia’s LMI solar pilot states that “[a]ny rebate or grant shall be in the amount of no more than \$2 per DC watt for up to six kilowatts of solar capacity installed.” We interpret this provision to be a cap on the incentive amount, not on the allowable system size under the pilot program. We think that it is likely that system sizes could exceed six kilowatts under the pilot since the median residential solar system size is over six kilowatts in the US.

Conclusion

Overall, Virginia is well-primed for the launch of a solar program for LMI homeowners. The Commonwealth has a statutory directive to launch a LMI solar pilot program, and a surge of solar-friendly policies have opened up the residential solar market in Virginia considerably in recent years. But considerable work lies ahead to get a pilot off the ground under existing resource and statutory constraints.

A significant part of the challenge for LMI solar pilot program development comes down to project economics. Virginia's relatively low cost of electricity makes it difficult to pencil out residential solar projects for LMI households.

We welcome feedback from DMME and the CEAB on our research and initial program design considerations.